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ABSTRACT

The Comprehensive Test of Basic Skills (CTBS) results of 81 West Virginia home-schooled children in grades 3, 6, 9, and 11 were analyzed. Means of each sub-section of these CTBS scores were analyzed for significant differences from the West Virginia public school means for the respective grades and subsections. Families of the children tested participated in a survey and telephone follow-up, results of which were analyzed for possible correlation with CTBS performance. Results indicated that third-grade home-schooled children scored significantly higher than the public school means in vocabulary, reading comprehension, mathematics concepts, science, and total mathematics; significantly lower in spelling; and similarly in other areas. Sixth-grade home-schooled children scored significantly higher in composite, vocabulary, reading comprehension, and total language means, and similarly in other areas. Ninth-grade home-schooling means were significantly higher in reading, lower in mathematics, and similar in other areas. Eleventh-grade home-schooling means were significantly higher in reading and similar in the rest. Survey results showed that family income, education and size differed from the state average, while families' occupations and locations were similar. Intended length of home schooling and children's CTBS performance correlated positively, while age at which children began formal studies and CTBS results correlated negatively. (SAK)

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AN ANALYSIS OF HOME-SCHOOLED CHILDREN'S COMPREHENSIVE TEST OF BASIC SKILLS RESULTS AND DEMOGRAPHIC CHARACTERISTICS OF THEIR FAMILIES

by

Mark Tipton

Abstract to a Master's Thesis Submitted to
Antioch University In Partial Fulfillment
of the Requirements for the
Master's of Arts
Degree

September 18, 1990

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An Analysis of Home-schooled Children's Comprehensive Test of Basic Skills Results and Demographic Characteristics of their Families

Mark A. Tipton

This study sought to analyze Comprehensive Test of Basic Skills (CTBS) results of home-schooled children grades 3, 6, 9, and 11. Eighty-one children who were administered the CTBS in Spring, 1989 were selected for this study. Means of each subsection of CTBS results were tabulated and were analyzed for significant differences from the West Virginia public-school means for the respective grades and subsections. Next, a survey was sent to WVHEA home-schooling representatives to administer to the seventy-two families of the eighty-one home-schooled children. Telephone follow up was utilized. Then, survey results were analyzed for possible correlation with CTBS performance.

Analysis of CTBS results indicated that home-schooled children grade three scored significantly higher than the West Virginia public-school means in the areas of Vocabulary, Reading Comprehension, Mathematics Concepts, Science, and Total Mathematics, yet scored significantly lower in Spelling, and similarly in the remaining areas. The sixth-grade home-schooled children scored significantly higher than the public-schooled children's means in Composite, Vocabulary, Reading Comprehension, and Total Language, and similarly in remaining areas. Home-schooled children grades nine and eleven were administered the CTBS in the Spring, 1989, while the public-schooled children in the Fall, 1988. Thus, these results were analyzed by comparing the home-schooling means with Spring national

norms, and the public-schooling with the Fall norms. Then, the respective differences were analyzed through t-tests. The ninth-grade home-schooling means were significantly higher in the Reading areas, lower in Mathematics, and similar in the remaining areas. The eleventh-grade home-schooling means were significantly higher in Reading and similar in the rest. Concerning survey results, the distribution of home-schooling families' occupations and locale of residence are similar to those of West Virginia population, while the income, education, and family size differ significantly from the state. Further, a positive correlation was noted between intended length of home-schooling child's participation in home-schooling and CTBS performance. A negative correlation between age at which the child began formal studies and CTBS results was also discovered.

Conclusion

Thus, the West Virginia home-schooled children appear to be reared in a family environment which facilitates signs of academic achievement comparable to that of the West Virginia public schools.

AN ANALYSIS OF HOME-SCHOOLED CHILDREN'S COMPREHENSIVE TEST OF BASIC SKILLS RESULTS AND DEMOGRAPHIC CHARACTERISTICS OF THEIR FAMILIES

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Mark Tipton

A Master's Thesis Submitted to Antioch University In Partial Fulfillment of the Requirements for the Master's of Arts Degree

September 18, 1990

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CHAPTER ONE

INTRODUCTION

Background to the Problem

To one familiar with only present-day United States, the advent of the home-schooling movement may seem somewhat unusual. The picture many have of education is the classroom of same-aged children being taught by a professional. The envisioning of any other educational institution would be considered unusual by the twentieth-century American mind, though other options have been utilized. Education in early America was dominated by strong family involvement (Zimmerman, 1947). In fact, much of education received by children living during the Colonial period and early statehood of the United States was imparted by the parents (Lape, 1987).

Home education was the primary form of education in Colonial America. Education was not considered a public priority, but a parent's obligation to his child (Lape, 1987). Regardless of socioeconomic status, families of Colonial and Revolutionary America provided the child's education through parents' teaching (Whitehead and Bird, 1984). Even until the mid-1800's, though the Sunday School, the Infant School, the Lancasterian School, and other philanthropic efforts attempted to provide education for the unfortunate few, noncompulsory, home-centered education appeared to be the prevalent mode of transmitting academic and moral

values to the next generation (Lape, 1987). Many American leaders, such as George Washington, Patrick Henry, and Benjamin Franklin, were educated primarily by their parents (Eidsmoe, 1987).

The home school seemed adequate to educate not only these leaders, but also the bulk of early American society. Dupont de Nemours was requested by Thomas Jefferson to conduct a study concerning the literacy of the people of the United States. In 1800, de Nemours reported that he could find only 4 out of every 1000 who could not read and write. De Nemours attributed this success "to fathers reading the Bible and the newspaper to their children early in the morning before the day's activities began" (Eidsmoe, 1984, p. 288).

During the latter half of the 1800's, the home school fell into disfavor in this country. The new waves of poorly educated immigrants, their discomfort with the Protestant orientation of the educational system (Lines, 1986b), and the necessity of child labor which poverty brought upon these people, led to the formation of compulsory public education laws (Lape, 1987). These laws, however, were not strictly enforced until 1890 (Lines, 1986b) because many private agencies attempted to fill the immigrants' educational needs (Lape, 1987).

From the 1890's to the present, education has been assumed to be a privilege supplied by the public rather than an extension of commonly-held child-rearing practices. Home schooling has frequently come into conflict with the State due to the ascendance of attendance laws (Harris and Fields, 1982; Shepherd, 1986). By 1918, every state had passed compulsory education laws (Carrere, 1983); institutionalized education had become the norm, and home schooling slipped into ignominy.

The home school has recently reappeared in the United States. Home-schooling organizations, nationally recognized advocates, talk-show appearances, disappointment with traditional education and the search for other options (McCurdy, 1985) have brought home schooling into national prominence. The national publicity of successful home-schooled children, such as the Colfax children who were accepted by Harvard on the basis of college entrance exam results (Colfax & Colfax, 1988), allows society at large to become introduced to home education. Present estimates number the home-school participants at anywhere between 150,000 (Lines, 1985) to 1,000,000 (Moore, 1988). The home-schooling movement presents a radical restructuring of education (Divoky, 1983) and the challenge it manifests is felt by educator and parent alike (Van Galen, 1987b).

Definitions

The following terms will be utilized in this study and are defined here.

Home schooling: a "teaching situation wherein children learn in the home in lieu of a conventional school. The parents, tutors, or guardians assume direct responsibility for the education of their children" (Taylor, 1986, p. 14).

Public/Conventional schooling: the prevalent mode of education in the present-day United States, characterized by a specially trained and licensed educator who oversees the daily academic regimen of a number of children.

Grade equivalent: the grade a home-schooled child would attend if he/she were enrolled in a conventional school.

Test score: CTBS scores which are used for purposes of analysis.

Statement of the Problem

Much of the disagreement about home schooling centers around provision for adequate education (Mahan and Ware, 1987). Are home-schooled children receiving an education comparable to those educated in the public school? In addition, is a parent able to provide a child with a suitable academic experience for a complex and technologically advanced society?

Purpose of the Study

This study proposes to analyze the academic achievement of selected home-schooled children. It seeks to determine the academic performance of children educated primarily by parents as compared with public-schooled children. It also attempts to provide a profile of the typical home-schooling family and to ascertain familial characteristics which might predict academic outcomes of the children.

Importance of the Problem

The academic experience of any child is vitally important. Thus, Sacken (1988) suggested that the belief that education is the foremost responsibility of government contributes to the misunderstanding concerning home schooling. Home-schooling parents, too, desire the best education possible for their children, but have chosen a nontraditional mode to perform this function (Williams, Arnoldsen, and Reynolds, 1984). In order to ascertain the quality of education which the home-schooled child receives, governmental agencies and parents may wish to find evidence that home-schooled children receive education at least comparable to that of the public schools.

Some studies have sought to describe home-schooled children's academic performance in states such as Alabama (Rakestraw, 1987), Alaska (Greene, 1987), Washington (Washington State Superintendent of Public Instruction [WSSPI], 1985), Oregon, Tennesee, North Carolina, Idaho, and Colorado (Moore, 1990, May 10). No such studies have been conducted in West Virginia, though. Yet, West Virginia may represent one of the most appropriate locations for home schooling. McAvoy (1986) recognized that the Appalachian hill region has deterred centralized education because of the travelling difficulties. West Virginia has also liberalized the requirements for home-schooling families. Thus, descriptions of West Virginia home-schooling families and their educational experience may facilitate more informed educational decisions.

The importance of the present study lies in the necessity of children's education, the monitoring of that academic endeavor, and the political and educational policy concerns.

A review of the literature will allow one to determine the significance of this study as an addition not only to home-schooling literature, but also to that of family theory in guneral.

Literature Review

A fuller literature review appears in chapter two. This section serves as an introduction to the literature concerning home schooling. Though being limited in the past (Ray, 1986), the amount of research has increased to such an extent that it may represent one of the most extensively researched areas in American education today (Moore, 1990, May 10). Three related areas will be examined in this review: 1) the

influence of family on the child's academic achievement; 2) the home school as represented in the literature; and, 3) the Comprehensive Test of Basic Skills (CTBS) as a measurement of academic success.

Family Influence on Academic Achievement

Family closeness and parent involvement with children appear to influence the children's academic performance. Parents who seem very interested in their children and value their interests, activities, and academic endeavors usually facilitate educational achievement in their children (Rice, 1974). Thus, the importance of the family influence on academic achievement, and characteristics of families with academically gifted children will be considered.

Importance of Family

The family appears to wield more influence on the child's academic achievement than many other factors. Smith (1983), Watson, Brown, and Swick (1983), Pandey (1984), Fehrmann, Keith, and Reimers (1987), and Phillips (1987) found that parental support determined children's academic achievement.

Family Characteristics

Olszewski, Kulieke, and Buescher (1987) provided a framework for categorizing characteristics of families which facilitated children's academic success. Their categories were: 1) family structure; 2) family environment; 3) parental expectation; and 4) parental modeling.

Family Structure

Family demography, such as it's size, affects the child's academic achievement. Blake (1989) found a negative correlation between family size and incidence of graduation from high school. The larger the family,

the less likely the child would graduate from high school. Olszewski et al. (1987) also noted that first-born children achieve giftedly more than do children of later birth in the family and that presence of two parents and their age at birth of child influence children's academic achievement.

Family Environment

Another aspect that may be useful to examine in the lives of an academically successful child is the general home environment. The environment includes the parents' attitude toward the child, affect between family members, and family relational beliefs. Carvalho (1982), Dauley (1982), Marjoribanks (1982), Gorlich (1983), Pandey (1984), and Arbuckle and MacKinnon (1988) have suggested that the family environment of the academically successful included such attributes as time parents spent with children, home educational environment, parental support, presence of both parents, and warmth of relationships.

Parental Expectation

Often, children attempt to live up to their parents' expectations. The children judge their worth and the desirability of academic success by their perceptions of parental expectations (Phillips, 1987). For example, low-readiness and high-readiness Black first graders achieved these respective levels largely because of their mothers' expectations of the respective children's performance (Scott-Jones, 1987). The values parents portray concerning success, winning, persistence, academic achievement, and involvement in cultural pursuits influence the values which children espouse (Clark and Worthington, 1987; Olszewski et al., 1987).

Parental Modeling

Parents can express verbal approval for certain values, but the

modeling of these values may affect the child more. Parents who have reared academically successful children have sought intellectual advancement themselves (Olszewski et al., 1987), and structure the home environment to facilitate educational activities (Mordkowitz and Ginsburg, 1986; Pikcunas, 1986).

The literature seems to support that family demographics, intimacy of environment, parental expectations, and the values modeled by parents affect the scholastic outcomes of children. What would be the outcome, though, if the parents were to decide to become totally responsible for their children's academic endeavors, including teaching them?

The effects of home schooling, as reported in the literature, is reviewed below.

Home Schooling

The home school is most frequently treated in the literature in reference to constitutional issues. Family characteristics and the children's academic experience, however, are also noted. Though concerns are raised about quality of the home-schooling family and it's ability to facilitate academic achievement (Franzosa, 1984; Lines, 1986a), the articles about the home-schooling family represent it as nurturing and supportive to the child's emotional and academic needs. Characteristics of home-schooling families and the academic achievement of the children are addressed in this literature review.

Family Characteristics

To examine whether the home-schooling family is characterized by many of the qualities which describe families with academically gifted children, the framework suggested by Olszewski et al. (1987) will be

utilized. Before this comparison of family qualities is reviewed, reasons which motivate parents to educate their children at home will be noted.

Reasons

Some reasons for parents' choice of home schooling have been identified in the literature. Pitman (1987) classified home-schooling families into Harvard Bounds who wish to accelerate their children's academic achievement; New Agers who believe in the universal experience of mankind; and the Fundamentalists who believe that the home school is ordained by God. Van Galen (1987a) classified home-school families into two camps: Ideologues who enter into home schooling because of philosophical or religious reasons; and Pedagogues who believe that the home is the most efficient educational environment.

Other reasons for home schooling include the desire to guide the child's moral development (Gustavsen, 1981), travelling difficulties and geographic proximity (Greene, 1984), objections to traditional school procedures (Van Galen, 1987a), or existence of a handicapped child (Kilgore, 1987).

Family Structure

The home-schooling family's structural characteristics are similar to those of families with gifted children (Gustavsen, 1981; Linden, 1983; Greene, 1984; Rose, 1985; Wynn, 1985; Taylor, 1986) except in a few areas. The differences include family size (Taylor, 1986), income (Linden, 1983), and locale of residence (Gustavsen, 1981; Greene, 1984; Taylor, 1986).

Family Environment

The choice of home schooling appears to facilitate much closer interaction between family members. Parents who choose home schooling

wish to continue intimate relationships with their children which may not be possible through traditional educational options. Williams et al. (1984) reported their observations of home-schooling families and found great intimacy in conversation and even in academic pursuits. Van Galen (1987a) reported that home-schooling parents chose this option because of the increased time which they would have to spend with their children. Gustavsen (1981), Green (1984), Taylor (1986), Mahan and Ware (1987), and Van Galen (1988) attested to the home-schooling parents' desire to facilitate their children's moral and academic growth.

Parental Expectation

Home-schooling parents appear to expect their children's adherence to family-held and/or religious/moral precepts which include academic pursuits. These parents usually choose home schooling because of a belief about the children's need to live successful lives, both morally and academically. They regard public schooling as inadequate to facilitate their children's optimal development. Williams et al. (1984), Reynolds and Williams (1985), and Van Galen (1987a) identified the parental expectation implicit in the choice of home schooling: a child can perform well academically and morally, if provided a nurturing environment.

Parental Modeling

Many parents educate their children at home because of perceived advantages in modeling values. Williams et al. (1984) recognized the presence of parental modeling, especially when children view their parents researching children's questions. Pitman's (1987) New Age community believed that children should learn from their parents that learning never ends, even for adults. Van Galen (1987a) reported that home-schooling

parents enjoyed exhibiting firmly held morals before their children and avoided conventional schooling because of it's perceived detriment toward transmission of moral values from parents to children.

Many objections have been voiced about the quality of relationships of home-schooling families (Lines, 1986a). The literature, however, appears to indicate that these families enjoy nurturing and intimate relationships, and that home schooling is an extension of the desire to provide an atmosphere conducive to the child's intellectual and moral growth.

Academic Achievement

The academic achievement of home-schooled children has been treated relatively frequently in research literature. Frost (1987) reported achievement test results of Illinois children. Rakestraw (1987) compared Alabama home-schooled children's test results with public school norms. Greene (1984) and the Alaska Department of Education (1986) reported ongoing testing in the Centralized Correspondence Study (CCS) program and found that the children educated primarily by parents scored significantly higher than their conventionally schooled counterparts. The WSSPI (1985) evaluated it's Parent-as-Tutor program and found substantially higher scores than the state norm. Maarse-Delahooke (1986) reported little intelligence quotient variance between home-schooled children and private-schooled children, and Quine and Marek (1988) noted superior cognitive abilities of home-schooled children as compared with public-schooled children.

These studies agree that home-schooled children score at or above the norms for the given achievement batteries (Lines, 1986a).

Considering these findings, home-schooling families of West Virginia will be studied to ascertain the children's academic success and the family characteristics which might influence this achievement.

Research Methodology

The research design is ex post facto. Because of the after-the-fact nature of the study, the subjects studied could not be randomly assigned to experimental and control groups. Thus, a quasiexperimental design is employed. The groups studied were: 1) West Virginia home-schooled children; and 2) the normative West Virginia public-schooled children. The dependent variable is the CTBS scores for third, sixth, ninth, and eleventh grades which were gathered from tests administered in the 1988-1989 school year. The third and sixth grades were administered the CTBS during the Spring, 1989. The ninth and eleventh grades were administered the test in different parts of the year; the public school in October, 1988 and the home-schooling sample in Spring, 1989. Therefore, the ninth- and eleventh-grade group means are to receive a different statistical treatment than the lower grades.

The results were obtained from Dr. Phil Suiter, Director of West Virginia Christian Educators Association, who collected data through a regional testing program made available for home-schooling families.

Next, a demographic questionnaire was sent to representatives of home-schooling families whose children were administered the test. The demographic data obtained from this survey will assist in ascertaining the comparability of the home-school and the public-school groups through use of appropriate statistical procedures, such as t-tests. The statistical comparability of both groups will be ascertained through use of the

Statistical Abstracts of the United States (United States Bureau of the Census, 1989).

A third part of this study will consist of finding demographic variables which may contribute to CTBS results of home-schooled children. Utilizing the Statistical Package for the Social Sciences (SPSS) (1988), multiple regression analysis will manifest if any correlations exist between home-schooled children's test scores and demographic variables.

Certain hypotheses will be tested through the analysis of survey and test scores.

Hypotheses

The hypotheses will be divided into three sections: 1) a comparison of CTBS scores of home-schooled and public-schooled students; 2) analysis of demographic characteristics of home-schooling families; and 3) analysis of family characteristics related to CTBS scores of home-schooled children. Null hypotheses will be described under Research Methodology, chapter three. The third-and sixth-grade groups are to be compared through use of t- tests. The ninth-and eleventh-grade means, however, were analyzed by comparing them with Fall (for public-schooled children) or Spring (for home-schooled children) national norms. Then, the respective differences were tested by use of t-tests.

CTBS Scores

1. The first set of hypotheses includes Composite means for grades 3, 6, 9 and 11.

    a) Concerning third-grade means, a statistically significant difference exists between mean Composite scores of the home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between mean Composite scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Composite means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Composite means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

2. The second set of hypotheses includes Vocabulary means for grades 3, 6, 9 and 11.

a) Concerning third-grade means, a statistically significant difference exists between the mean Vocabulary scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between mean Vocabulary scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Vocabulary means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Vocabulary means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-

schooled children.

3) The third set of hypotheses includes Reading Comprehension means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, a statistically significant difference exists between mean Reading Comprehension scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, a statistically significant difference exists between mean Reading Comprehension scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Reading Comprehension means, a statistically significant difference exists between the difference of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Reading Comprehension means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

4) The fourth set of hypotheses includes Spelling means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, a statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, a statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Spelling means, a statistically

significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Spelling means, a statistically significant difference exists between differences of the means from the respective norms for home-schooled and public-schooled children.

5) The fifth set of hypotheses includes Language Mechanics means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Language Mechanics means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Language Mechanics means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

6) The sixth set of hypotheses includes Language Expression means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant

difference exists between mean Language Expression scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between mean Language Expression scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Language Expression means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Language Expression means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

7) The seventh set of hypotheses includes Mathematics Computation means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant relationship exists between mean Mathematics Computation scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between mean Mathematics Computation scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Mathematics Computation means, a statistically significant difference exists between differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Mathematics Computation means, a

statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

8) The eighth set of hypotheses includes Mathematics Concepts means for grades 3, 6, 9, and 11.

   a) Concerning third-grade means, a statistically significant difference exists between mean Mathematics Concepts scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, a statistically significant difference exists between mean Mathematics Concepts scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Mathematics Concepts means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Mathematics Concepts means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

9) The ninth set of hypotheses includes Reference Skills means for grades 6, 9, and 11.

   a) The third grade was not tested in this area, since the publisher did not include this subsection in the test.

   b) Concerning sixth-grade means, a statistically significant difference exists between mean Reference Skills scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Reference Skills means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Reference Skills means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

10) The tenth set of hypotheses includes Science means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Science means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Science means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

11) The eleventh set of hypotheses includes Social Studies means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Social Studies means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Social Studies means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

12) The twelfth set of hypotheses includes Total Reading means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Reading means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Reading means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled children and public-schooled children.

13) The thirteenth set of hypotheses includes Total Language means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Language means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Language means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

14) The fourteenth set of hypotheses includes Total Mathematics means for grade 3, 6, 9, and 11.

a) Concerning third-grade means, a statistically significant difference exists between mean Total Mathematics scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, a statistically significant

difference exists between the mean Total Mathematics scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Mathematics means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Mathematics means, a statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

Demographics

15) A statistically significant difference exists between distribution of occupations of home-schooling and public-schooling fathers.

16) A statistically significant difference exists between locale of residence of home-schooling and public-schooling families.

17) A statistically significant difference exists between the number of years of formal education which home-schooling parents have attended as compared with those of public-schooling parents.

18) A statistically significant difference exists between the mean yearly incomes of home-schooling and public-schooling families.

19) A statistically significant difference exists between the mean family size of home-schooling and public-schooling families.

Predictors of CTBS Scores

20) A statistically significant relationship exists between the number of years which a child is intended to participate in a home school and CTBS Composite scores.

21) A statistically significant relationship exists between home-schooling parents' prior teaching certification and the child's CTBS Composite scores.

22) A statistically significant relationship exists between home-schooling family size and CTBS Composite scores of the child.

23) A statistically significant relationship exists between home-schooling family's mean annual income and the child's CTBS Composite scores.

24) A statistically significant relationship exists between the locale of residence of home-schooling families and the child's CTBS Composite scores.

25) A statistically significant relationship exists between the age at which a home-schooled child began formal academic studies and CTBS Composite scores.

26) A statistically significant relationship exists between prior conventional education which a home-schooled child has experienced and his/her CTBS Composite scores.

Certain factors will affect the testing of these hypotheses: some can be controlled; others may present some difficulty.

Limitations and Delimitations

Certain limitations of this study may exist. Due to the ex-post-facto nature of this proposed study, the random assignment of the sample to control and experimental groups is not possible; thus, the representativeness of the sample may be affected. The limitations of achievement batteries have been noted in the literature (Linn, 1985). In order to compare the CTBS results with the state testing program, the West

Virginia home-schooled children will be limited to third, sixth, ninth, and eleventh grades. Another limitation involves the testing dates of the ninth- and eleventh-grade groups. The public-schooling groups were administered the CTBS in October, 1988, while the home-schooling groups were tested in March, 1989. Thus, the comparison of ninth- and eleventh-grade group means will be affected.

This study has been delimited to include only home-schooled children who were administered the CTBS in Spring, 1990 by the West Virginia Home Educators' Association.

CHAPTER TWO

LITERATURE REVIEW

The following areas will be reviewed because of their relevance to understanding the home-schooling family: 1) the relationship between family intimacy and academic achievement; 2) the home-schooling family itself; and 3) the Comprehensive Test of Basic Skills (CTBS) as a measure of students' academic achievement.

Family Intimacy and Academic Achievement

The family appears to affect the academic success of children. In the literature, the relationship of the family is emphasized and the characteristics of families with academically successful children receive treatment.

Importance of Family

The relationship between parents and their children appears to correlate positively with their academic achievement. Carvalho (1982) reported that home environment correlated highly with academic achievement in his study of one hundred and thirteen female applicants' performance in a ninth-grade entrance exam. The achievement scores in the areas of reading, math, and language correlated closely with thirteen measured home environment characteristics. Watson, Brown, and Swick (1983) also studied the importance of home environment by collecting a random sample of three hundred and sixty-two homes in two suburban school districts to choose seveteen hundred first-graders. These families were studied for family

support behavior, neighborhood support, level of income and education, while the children were given a Cognitive Skills Battery. The researchers concluded that the amount of parental support given to the child was positively correlated with the child's academic achievement, regardless of parents' income or educational level. Likewise, Bradley et al. (1989) studied the cognitive development of sub-three-year-olds among White, Black, and Mexican American samples from six sites across the United States and found that, while social status was not related to quality of home environment or a child's development, home environment determined the cognitive ability of these sub-three-year-olds. Singh (1983) reported that academic achievement strongly correlated with parental support and Dauley (1982) found, after analyzing sixteen hundred grade school children from Southern Ontario, that home environment affected reading aptitude more strongly than did classroom climate.

The amount of time parents spend with their children seems to affect students' success. Fehrmann, Keith, and Reimers (1987) selected a random sample of twenty-eight thousand fifty-one high school seniors from one thousand sixteen high schools to determine effects of parents' involvement on the grades of these students and found that their involvement related positively with students' grades.

Smith (1983) found that home educational environment manifested a significantly strong influence on the children's academic performance. Concerning the Black child, Bowman and Howard (1985) found that the child whose parents and/or grandparents explained racial issues to him/her and/or encouraged him/her to overcome blocked opportunities performed well educationally. Phillips (1987) claimed that children rated their own

academic performance by their perceptions of their parents' opinion of the grades rather than by letter grades themselves.

That family environment and intimacy correlates positively with children's academic achievement can also be ascertained from the claims expressed in the literature about effectiveness of incorporating familial qualities into educational environments. Anderson (1970) found that group cohesiveness and closeness affected the academic achievement of high-ability high-school females. Singer and Weissman (1974) incorporated family elements of self disclosure and personal involvement between students into a college class and found that this environment enhanced student affect toward learning and comprehension of material.

Other discussions in the literature describe programs which utilize families to perform educational activities usually performed by a conventional school. Neifert and Gayton (1973) characterized the kind of families appropriate for a home remediation program for learning-disabled children. Participation of fathers, positive mother/child relations, healthy role portrayal, and few children in the family are factors which affect the applicability of this program. Ostlund, Gennaro, and Dobbert (1985) outlined a science program which allowed parents and their children to learn together. They cited that the child's learning and attitudes toward parents were significantly higher if the child perceived highly cooperative learning with the parents. These researchers suggested that parents take more important roles in the education of the children. Therefore, educational endeavors which include warm, family-like relationships encourage positive affect toward learning and ready absorption of material presented in class.

Though certain characteristics of the family appear to predict student academic achievement, what is it about families that facilitates academic success? Many characteristics of families with academically successful children have been identified in the literature.

Family Characteristics

Family characteristics have been classified by Olszewski et al. (1987) into four areas: 1) Family structure; 2) Family environment; 3) Parental expectation, and 4) Parental modeling.

Family Structure

Family structural characteristics include those demographic factors which influence family interaction. Examples of these include birth order, family size, parents' education and age. Blake (1989) discovered that the most significant factor influencing the likelihood of high school graduation is the size of the family from which the students come. Smaller families tend to experience the greatest incidence of their children who graduate. Other demographic factors include parental education and father's socioeconomic status (Clark and Worthington, 1987). Gorlich (1983) reported that education, occupation, and income of father, and the number of parents in family influenced the academic achievement of the child. Schilling (1982) found that single-parent children achieve at a significantly lower level that two-parent children in reading, math, and composite scores. Scarborough (1989) cited that the incidence of reading disability in the family predicted reading disability in children.

Gallagher and Coche (1987) recognized the effects of different family demographic profiles on the academic achievement of children. Shifts in age of parents, divorce rates, number of dual-career couples,

and maternal development beliefs have hindered the amount of time parents can spend with their children. Because of the ensuing guilt, many parents choose preschools which provide an educational "hothouse" environment to compensate for the lack of parental participation. The researchers suggested that early academic structuring in the absence of parental intimacy subjects their toddlers to the alienation and depersonalization of an institutional environment and to short-lived academic gains. Piotrkowski and Katz (1982) similarly recognized that dual-career couples tended to encourage their children to build a lifestyle which adapts to the parents' professions and which emphasizes autonomy of the children, especially in academic and moral affairs, exposing them to the same alienation cited in Gallagher and Coche (1987). Thus, family demographics do appear to affect children's academic performance.

Family affective environment, however, can overcome the effects of income, socioeconomic status, family size, or parental education and, thus, is an important factor in the development of academic achievement.

Family Environment

Family affective environment seems to influence children's academic achievement. Warmth of parent/child, parent/parent, and child/child relations appears to provide an environment conducive to learning. Arbuckle and MacKinnon (1988) hypothesized a model of determinants of children's academic achievement. They suggested that spousal relations, parental locus of control, and parental self-concept affected the child's instrumental competence, achievement motivation and aptitude which led finally to the child's academic achievement. They tested this model by selecting a random sample of thirty upperclass children and their mothers.

The mothers were tested in the parental area of the model while the children were tested in their respective section of the model. The researchers reported significant positive correlations between all factors of this model. Mothers' use of implicit directives and the overall positivity of mother/child interactions were also associated with the child's academic achievement.

Burton (1983) studied sixty mother/five-year-old child pairs in reference to the mothers' warmth and the child's corresponding game performance scores. The highest child game scores occurred when the mothers gave immediate warmth contingent on their children's academic performance. Burton concluded that two levels of maternal warmth exist: 1) a consistent warmth which permeates the parent/child relationship; and 2) a warmth given as reinforcement for a child's appropriate actions. In addition, Clark and Worthington (1987) suggested that family intimacy predicted positive transmission of family religious values, including interest in academics. MacKinnon, Brody, and Stoneman (1982) studied sixty families with children aged three to six years for home environment stimulation and intimacy. Dividing the families into groups of married/working, married/nonworking, and divorced/working mothers, the researchers found that the married families provided more cognitive and emotional stimulation for the children, and that the married/nonworking mother families stimulated children slightly more than married/working mother families.

Concerning the relations of families with gifted children, Matthews, West, and Hosie (1986) found healthy interactions among family members. Studying the family relations of 125 children enrolled in a university-

sponsored Summer gifted program through use of a mailed assessment instrument, the researchers found that the families of these gifted children scored significantly higher than the norming group in six of the seven subsections: problem solving,communication, roles, affective responses, behavior control, and general functioning.

Some tension has been noted in families with gifted children, though. Hackney (1981) suggested that the presence of a gifted child affects the family in the following ways: 1) parents experience difficulty in maintaining family roles; 2) parents' feelings about themselves are altered both positively and negatively; 3) the families are, at times, required to make special adaptations; and 4) the parents and school are sometimes forced to meet increased educational demands which are required by the presence of a gifted child. Ballering and Koch (1984), however, discovered that sibling relationships are more affected by giftedness than are relationships between the gifted child and the parents. Kranz (1982) concluded that parents are the gifted child's strongest link with reality and the most consistent emotional support. Therefore, parents should build positive relationships with their child because of the alienation which he/she may feel from age-mates and siblings. McCurdy (1960) recognized the influence parents can exert over the child's development of intelligence after reviewing the biographies of twenty geniuses and found three common factors: 1) the parents were intimately involved with their precocious children; 2) the geniuses were relatively isolated from their peers; and 3) the children were allowed freedom to explore their own interests.

Though tension exists in families of gifted children, the intimacy

between members seems to permeate the interrelations. Parents who relate closely with their children can more effectively communicate their own firmly held academic values to them.

Parental Expectation

The child's perception of his/her parents' values and beliefs also appears to affect academic performance. Phillips (1987) selected eighty-one middle-and upper-socioeconomic status third-graders who ranked at the 77th or higher percentile on a standardized achievement test and who performed in the top one-third of their classes. The parents completed an instrument which measured parental perceptions of their child's academic ability. Utilizing Path Analysis, she concluded that the child's perception of his/her academic performance was influenced more by the parents' appraisal of the child's performance than the actual grade earned. She emphasized, moreover, that the students' perceptions might limit their desire to confront future problems and more difficult academic endeavors.

Concerning Asian American children, Pikcunas (1986) noted that strict maternal guidance, parental deference to educational authorities, and parental interest in indulging themselves in American education frequently were associated with the child's academic success. Scheinfeld (1983) found that mothers of high-achieving Black children voiced higher expectations of them than mothers of low-achieving children. Rice (1974), too, suggested a positive relationship between mothers' child-rearing beliefs and their children's academic success.

Thus, it appears that parents expressing their values to their children encourages academic performance. However, if these values are to

be influential, they must be held strongly enough to be enacted by the parents.

Parental Modeling

Parents who exemplify the same values which they expect from their children increase the likelihood of children emulating these values. McBroom, Reed, Burns, Hargraves, and Trankel (1985) expressed that modeled family structure characteristics, such as democratic decision-making and sharing of responsibilities, allow children better assimilation of family values. Fehrmann et al. (1987) found that the example which a parent exhibits when involved in the child's homework was correlated positively with the child's grades. Mordkowitz and Ginsburg (1986) called attention to the desire of the Asian-American parent of academically successful children to facilitate their learning by structuring homework time, placing chores at a lower priority than homework, and limiting entertainment.

A framework for categorizing characteristics of families with academically successful children was provided by Olszewski et al. (1987). Family demographics, environment, values expected, and values enacted appear to foster academic achievement in children.

How these characteristics function within home-schooling families will be examined next.

Home-Schooling Families

The home-schooling family and it's educational experience has been examined in the literature. Characteristics of home-schooling families, and the children's academic achievement will be reviewed.

Characteristics of Home-Schooling Families

Reasons home-schooling families have chosen this educational option for their children will be presented. Then, utilizing the Olszewski et al. (1987) framework, the characteristics of home-schooling families will be identified.

Reasons for Home Schooling

While reasons parents give for the choice of home education vary with the individual experience of each family (Lines, 1986a), certain reasons appear frequently in the literature. Pitman (1987) classified motivations for home schooling in the following ways: 1) Fundamentalist Christians who revere the Bible; 2) New Agers who respect the universal experience of mankind; and 3) Harvard Bounds who believe that individual instruction nurtures a child's creativity better than does the traditional school. Van Galen (1987b) categorized home-schooling families into two groups--Ideologues and Pedagogues. Ideologues chose home schooling because of religious, philosophical or political reasons, while Pedagogues believed that children learn more proficiently under individualized instruction.

Many families choose to school their children at home because it represents a logical extension of their lifestyle (Divoky, 1983). Emphasizing the importance of family closeness and control, these families seek to rear their children in the protection of the home. Thus, socialization experiences of children represent an important reason for home education (Williams et al., 1984; Common and McMullen, 1986; Mahan and Ware, 1986; Kilgore, 1987). Many home-schooling parents strongly disagree with the values espoused by public schools (Van Galen, 1987a) and

with the perceptions of school officials over the value of social contacts a child makes in the school setting (Mahan and Ware, 1986).

Greene (1984) reported that 18% of Alaska home-schooling families chose this option because of a desire to extend control over their children's moral lives, and Gustavsen (1981) recognized the parents' emphasis on the moral development of their children.

Still other families choose home schooling because of physical factors. Many home-schooling families in Alaska (Greene, 1984) and Australia (Taylor and Tomlinson, 1984) have limited access to public schools because of distance from facilities. In Maine, Kilgore (1987) cited that, in addition to traveling factors, existence of a handicapped child in the family motivated some parents to educate the child at home. McAvoy (1986) recommended home schooling to West Virginia families because of the treacherous hills one must cross to arrive at many public school facilities.

Motivations for home schooling appear to center on the parents' perception of their children's needs. The parents' values, in turn, determine how they view the education of their children.

Equally important to understanding the home-schooling family is the recognition of it's demographic characteristics.

Family Structure

The literature surveyed depicts the home-schooling family in the following ways. The home school is operated primarily by the mother (Gustavsen, 1981; Greene, 1984; Rose, 1985; Wynn, 1985), yet both parents participate jointly (Gustavsen, 1981). The male parent is usually a professional or skilled worker (Gustavsen, 1981; Rose, 1985; WSSPI, 1985),

gaining an income which ranges from $10,000 (Linden, 1983) to $35,000 (Rose, 1985; Wynn, 1985; Taylor, 1986).

Educationally, many of these parents have attended one to three years of college (Gustavsen, 1981; Greene, 1984; Wynn, 1985; Taylor, 1986), while a significant number hold Bachelor's degrees or higher (Gustavsen, 1981; Greene, 1984).

The average number of children in the family has been reported to be two (Gustavsen, 1981), 3.7 (Taylor, 1986), or 4.74 (Linden, 1983). On the average, the home-schooled child began formal education at 5.45 years of age (Taylor, 1986), tended to be evenly distributed by sex (Taylor, 1986), shared the endeavor with one other sibling (Wynn, 1985), and would continue home schooling for three to five years. The families most likely resided in rural and small town situations (WSSPI, 1985; Taylor, 1986), and were geographically well distributed across the United States (Taylor, 1986).

The typical home-schooling family appears to be larger than the average size of American families and lives in small a community. However, the other structural characteristics of home-schooling families seem similar to other American families.

Family Environment

The home-schooling family appears to be very intimate in the relations between members. Reynolds and Williams (1985) observed that the home-schooling families they studied talked often with each other, emphasized moral values, and valued each member's contribution to the family. The children read much by themselves and took breaks to ask their mothers questions about the books. Van Galen (1987a) cited the parents'

emphasis on family intimacy. The parents believed that home schooling restored the closeness of relationships which appeared to be threatened by traditional schooling. Dibara (1987) and White (1987) found that parents believed that home schooling bolstered children's moral development and allowed parents to participate more intimately in their children's moral and academic endeavors. Gustavsen (1981) also cited the parents' desire to facilitate their children's learning more intimately than they perceived was possible in public schools.

Home-schooling parents see their child's development as their own responsibility and choose not to bequeath this right to any other. Pitman (1987) interviewed a community which espoused "New Age" philosophies, such as distrust of institutions and acceptance of Eastern religious principles, for beliefs about education. The parents believed that they are the ones from whom a child should learn life skills, social skills, and academics, and that the child is most effectively instructed individually. McAvoy's (1986) case study reported that the parents observed spent much time with their children inside and outside of academic experiences. Williams et al. (1984) observed that the parents sought to maintain intimacy with their children by performing such activities together as doing chores, designing curriculum which integrates practical and academic learning, and providing service for the unfortunate.

Moore's (1982) summary of environmental characteristics of home-schooling families stated: 1) these parents have enough concern for their children to teach them systematically; 2) the parents provide a partiality which schools cannot allow; and 3) the child in the home

school receives from ten to one hundred times as many adult-to-child responses as he would in a formal school.

When intimately involved with their children, parents have more opportunities to teach their values. The home school seems to provide such opportunities.

Parental Expectation

As in many families of gifted children, the parents of home-schooled children wish their children to emulate their values. These parents believe that, while traditional education options dilute parents' influence on their children's moral development, home schooling allows a more positive transmission of parental expectations and values (Pitman, 1987). Williams et al. (1984) reported that the home-schooling parents held high regard for their children's creativity, interests, and academic achievement, and believed that other educational options would detract from the children acquiring these values from their parents. Many home-schooling parents consider the public school to be subversive toward children acquiring family-espoused values. As Van Galen (1987a) noted, "These parents believe that their children would be harmed morally, spiritually, and intellectually if they attended pubic institutions and that they would be remiss in their duties if they sent their children where Truth was not being taught" (p. 168). Common and McMullen (1986) characterized home-schooling parents as "do-it-yourselfers" who value their children's character development and academic achievement so highly that they believe that only parents can handle the job adequately. Rose (1985), Chiemelewski (1987), and White (1987) have also documented the importance which home-schooling parents place on the transmission of moral

and academic values to their children.

Every facet of the home-school family is pervaded by firmly held moral and academic standards. These families express their freedom to guide the moral and academic development of their children in areas of curriculum (Rose, 1985; Van Galen, 1988), character development (White, 1987), and socialization (Dibara, 1987). They also have expressed the wish to schedule their school day so that basic skills (Rose, 1985), Bible study (Williams et al., 1984), integration of practical and academic skills (Van Galen, 1987b), service to the needy (Moore, 1984; Williams et al., 1984), and practical work experience (Moore, 1984) might be performed by children in a context of firmly held moral convictions.

Thus, home-schooling families tend to emphasize the moral development and academic growth of the children and the transmission of values from parents to children. Believing that traditional schooling dilutes parental influence and hinders children learning, these parents wish to train their children during the impressionable years so that they might not adopt questionable moral and academic values in the teen and adult years. Home schooling allows parents freedom to transmit values to children and also speaks as a model of independence of thought and subservience to convictions.

Parental Modeling

Many parents attempt to model their firmly held moral values through the use of the home school. Although most home-schooling parents are themselves well educated (Rose, 1985; Taylor, 1986), they often become more interested in continuing to learn new concepts than do their children (Williams et al., 1984), exhibiting good models of learning for their

children. Pitman (1987) reported that the "New Age" community believed that learning is a life-long process and that the children should learn that their parents continue to learn also.

Independence of family systems is clearly modeled by the home-schooling parents. Home-schooling families are characteristically self-sufficient and private about their affairs. Thus, new home-schooling parents sometimes experience difficulty selecting curricula because of the norm of privacy of teaching methods and curricula choice of others (Van Galen, 1988). Much emotional support is given to new home-schooling parents, though, in the form of reminders of convictions and motivations. Many of these parents wish to meld moral conviction and academic studies, a concept which they consider unemphasized by public schools. Though the norm of privacy in home-schooling circles does not allow for intervention into teaching practices which the parents adopt (Van Galen, 1988), the home-schooling parent, in the face of doubt, manifests great tenacity and independence of thought until he/she finally feels initiated into home-schooling by adapting to curriculum demands. The child is given opportunity to behold the parent's devotion to principle. This norm which values independence of thought appears to be transmitted to the children and is manifested through the home-schooled child's low susceptibility to peer suggestion (Maarse-Delahooke, 1986).

The home school allows the parent ample opportunity to model firmly held values which other educational options may not allow.

As depicted within the Olszewski et al. (1987) framework, the home-schooling family in some ways is similar to other families with gifted children. The home-schooling family members appear to relate intimately

with each other. The parents also seem to utilize the home school as a vehicle to express firmly held values to the children without interference from competing value systems, such as those espoused by traditional school personnel or by negative peers. The parents, by virtue of the choice of home education, model moral and educational values which they see as counter to many of society's norms.

The home-schooling family differs somewhat demographically from families with gifted children. The size of the home-schooling family and other families with gifted children appears to differ. However, the size of the home-schooling family appears not to have adversely affected the quality of family interactions, since the mother's presence allows for much individual attention. Thus, Blake (1989), noted earlier, may have correctly described public-schooling families, yet neglected to isolate home schooling as a variable in her research.

The home-schooling family may act like a family with gifted children, but how well do these children perform academically?

Academic Achievement

Many researchers have attempted to compare the home-schooled children's academic achievement with that of public-schooled children. Frost (1987, 1988) drew a sample of seventy-four home-schooled children from a five-county area of northeastern Illinois. He found that home-schooled children scored higher than the national norm in all subsections of the test and that upper-socioeconomic-status students scored significantly higher that their public-school counterparts. Rakestraw (1987) sought to compare the academic achievement of home-schooled children with that of public-schooled children in Alabama. Employing a

two-tailed t-test, he found that in the areas of reading, mathematics, listening and language, Alabama home-schooled children scored comparably with their counterparts in the public school.

Greene (1984) reported Alaska home-schooled children's achievement testing. Alaska's Centralized Correspondence Study Program (CCS) allowed children grades K-12 to receive a formal education through the mail. Of the randomly sampled eighty-eight students, grades one to three scored superiorly in all sections of the California Achievement Test (CAT) as compared with the traditionally schooled students. The fourth-graders scored slightly higher than the state norms and fifth- to eighth-substantially higher in verbal areas. In the math subsections, all grades of home-schooled students scored at least one third standard deviation above the norm. The Alaska State Department of Education (1986) continued the study and found that the CAT scores for the CCS students grades one to three were .58 to 1.31 standard deviations above the norms while grades four to eight ranged from .67 to 1.12. In math, CCS students grades one to eight exceeded the norm by between .42 to 1.13 standard deviations. Further, the department found that CCS students, grades four to eight who had participated in the program for more than two years, scored significantly higher than those in the program less than two years.

The Washington State Superintendent of Public Instruction (1985) also evaluated the Parent-as-Tutor program. Utilizing the Stanford Achievement Test, the agency found that the sample of one hundred children achieved a percentile ranking of sixty-two in reading and fifty-three in math. Maarse-Delahooke (1986) found that home-educated children's WRAT scores were similar to those of private-schooled children.

Some studies have reported less complete, yet suggestive, information. Reynolds' and Williams' (1985) case study revealed an eight-year-old child whose SAT scores were fourth-grade level in math, and tenth, eleventh, and twelfth in the areas of social studies, science, and reading, respectively. Similarly, the six-year-old of this family scored at second-grade level in math and eleventh-grade level in reading. Next, McAvoy's (1986) case study reported a third-grader who scored above the 90th percentile on all sections of the SAT and a second-grader with 80th percentile on most sections. Schemmer's (1985) description of home-schooled children, by contrast, reveals that only 40% scored equal to or above national norms. Gustavsen (1981) and Linden (1983) reported findings similar to those of Schemmer (1985).

Some researchers have attempted to describe home-schooled children's cognitive abilities with descriptors other than achievement scores. Quine and Marek (1988) utilized Piagetian tasks to determine the cognitive operations of home-schooled children. They reported that, while many public-schooled children obtain formal operations at about fifteen to twenty-one years, many of the samples of home-schooled children showed the same ability at the ages of ten or eleven years. Maarse-Delahooke (1986) compared home-educated children with a group from private schools. She reported little difference in the IQ, as measured by the WISC-R, of the home-schooled children as compared with the private-school group.

Certain studies have attempted to explain the effectiveness of parental teaching upon children's cognitive development. Ziegelman (1986) compared the effects of home-based and center-based teaching strategies on language skill development. The one hundred and sixteen enrollees of the

program were divided into control and experimental groups. She found that boys trained by their mothers showed greater language skills gains than those trained in the center. Scott-Jones (1987) researched maternal teaching behaviors of low-income Black mothers who either had low-readiness or high-readiness first graders. Choosing tewnty-four families, sixteen with low-readiness and eight with high-readiness children, she concluded from her interviews and observations that high-readiness mothers tended to be supportive of their first-graders and allowed them to take active roles in their learning. The low-readiness mothers held low expectations concerning their children's academic success as compared with high-readiness mothers. Thus, through expectations, involvement, and support, a mother can teach a child to be ready for academic endeavors. The home school appears to be a continuance of this maternal teaching behavior.

In sum, according to some of the articles, home-schooled children appear to score similarly or superiorly in achievement testing as compared with their public-schooled counterparts. Some of the studies, however, indicate that some home-schooled children scored lower than the norms. These studies, though, represent survey results or case studies only and, thus, may not be representative of the home-schooled children population. Lines (1986a) and Pitman (1986) both concluded that home-schooled children perform similarly to public-schooled children. Home-schooled children appear not to be neglected intellectually, but seem to experience an adequate educational preparation.

How West Virginia home-schooled children were tested to ascertain academic achievement demands examination of the testing instrument.

Comprehensive Test of Basic Skills

The Comprehensive Test of Basic Skills (CTBS) is a popular instrument to ascertain students' academic achievement. Contributing to this popularity are the carefully edited test booklets and examiner's manuals, expanded subsections, item compositions based on State Board of Education curriculum guides, and respect for ethnic, sexual, and disability biases.

Standard statistical practices were employed to estimate the quality of the test. Item analysis, distractor variables, and item bias measures were determined (Linn, 1985). The statistical rendering of validity, though, appears scanty. Linn (1985) reported that the Preliminary Technical Report's explanation of items numbers and percentage of students exhibiting mastery over the item manifested a mastery criterion of .75. Reliability appears to be better grounded. The sampling size of two hundred fifty thousand and the similarity of standard error of measurement scores between the forms of the test allow greater levels of confidence in the area of reliability.

The publishers attempted to provide scale scores which would allow comparison between and measurement across grade levels. The Item Response Theory (IRT) assumes that intervals of standard score gain equal similar increases in raw scores. This, however, is not the case. A student on the 90th percentile must increase fewer points to retain this ranking as compared with a student who has scored on the 10th (Shepard, 1985).

However, these difficulties do not detract from the usefulness of the CTBS. The IRT inconsistencies do not hinder comparison studies (Alaska State Department of Education, 1988), nor interpretation of

academic achievement test scores (Martellaro and Edington, 1983). Echternacht (1985) suggested a two-analysis methodology for presenting mean standard scores for grades one through six on the CTBS, allowing clear interpretation of scores.

Certain limitations exist for any achievement battery. Marzano and Jesse (1987) cited that of twenty-two general cognitive operations, the CTBS tested for only nine. In the same vein, San Diego City Schools (1984) found that the CTBS tested only for lower level cognitive operations as measured by Bloom's Taxonomy. Further, Baglin (1986) found disparity in tabulating results for achievement tests using four kinds of score ranking. The CTBS showed greater discrepancy between differing measures of standard scores than many of the other tests considered.

These difficulties seem not to be insurmountable. LeMahieu and Wallace (1985) attempted to validate the testing program of Pittsburgh City Schools using two test instruments--the CAT and the CTBS. A stratified random sample was drawn and the experimental and control groups assigned. They reported that no significant differences of scores between those taking the CAT and those taking the CTBS.

Taking into consideration limitations of testing procedures and interpretation, the CTBS seems to parallel other achievement batteries in validity and reliability. Shepard (1985) concluded that "CTBS Form U is one of the best developed standardized achievement test batteries available ... the only problem area of use of CTBS Form U is the application of Item Response Theory scaling ... Interpretation of amount of achievement gain for low- versus high-scoring examinees could be

misleading but within grade normative statements are not affected." (p. 389).

In spite of the limitations cited, the CTBS is recognized as a useful instrument in ascertaining academic achievement of students in K-12. The chief caution which should be exercised pertains to attempts to interpret scores across grade levels.

Summary

The literature review suggests that the family appears to be a good predictor of a child's academic achievement. The characteristics of families which produce academically successful students include family structure, family intimacy, parental values expressed to the child, and the parents modeling these values. The home-schooling family compares closely with many of the characteristics of families with gifted children. Moreover, the home-schooled child appears to score equal to or significantly higher than national norms in many of the studies reviewed, notwithstanding that a few articles indicate that some home-schooled children may not score as high as the norms.

Though much opposition and misunderstanding exist concerning home schooling and the quality of it's academic and social experiences (Lines, 1983; Franzosa, 1984), the children appear to be reared in a nurturing environment which provides much parent/child interaction and an adequate academic environment. Further, the use of the Comprehensive Test of Basic Skills appears to be adequate to measure the academic achievement of home-schooled children.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter describes the attempts to collect and analyze data concerning West Virginia home-schooled children and their families. Research design, data gathering and analysis, and null hypotheses are considered in this section.

Research Design

The design was ex post facto. Due to the after-the-fact nature of the study, a quasiexperimental approach was utilized. Random assignment to control and experimental groups was not possible. The two groups compared were: 1) the West Virginia home-schooled group; and 2) the normative West Virginia public-school students. Each of these groups were comprised of third-, sixth-, ninth-, and eleventh-grade (or grade equivalents) students who were administered the CTBS during the school year 1988-1989. The home-schooled children were administered the CTBS in Spring, 1989; however, though the third- and sixth-grade public-school children were also administered the test in Spring 1989, the ninth- and eleventh-graders took the test in October 1988.

Sample

The sample of home-schooled children was drawn from mailing lists held by the West Virginia Christian Educators' Association (WVCEA). Providing a testing service for home-schooling families, the WVCEA collected scores for K-12 grades and provided a mailing list of children

who were tested. The normative West Virginia CTBS data (this test being required of public-schooled children during grades three, six, nine, and eleven) were obtained from the West Virginia State Board of Education Testing Service. The number of home-schooling CTBS results utilized in this study numbered eighty-one from the four grades (thirty-nine third-, twenty-three sixth-, sixteen ninth-, and three eleventh-), while the normative West Virginia group totalled about twenty-four thousand for each grade.

Variables

Many factors were tested in this study. The independent variable was the mode of education chosen by the parent--home or public education. The dependent variable was the CTBS scores, both composite and subsections. Other factors were analyzed to ascertain the comparability of the families of home-schooled and the public-schooled students and also to identify characteristics which may have predicted home-schooled children's CTBS performance. Thus, parents' education and occupation, prior teaching certification, family annual income, home setting, number of children in the family, age at which child began formal academic training in the home school, and intended years to educate the child at home were requested by survey from the home-schooling families included in this study.

Instrumentation

The study intended to examine three topics. First, it sought to analyze CTBS scores of home-schooled children and public-schooled children. Using appropriate statistical methods, it intended to identify if any significant differences existed between the CTBS scores of home-

schooled children and the normative public-schooled sample. Next, this study sought to ascertain the comparability of the West Virginia home-schooling family and the public-schooling family. Last, this study attempted to identify characteristics of home-schooling families which may predict CTBS performance of their children.

Data Gathering

The WVCEA and the West Virginia Home Educators' Association (WVHEA) provided the testing service through which the home-schooling test data were gathered. The WVHEA organized the administration of the CTBS to home-schooled children in order to fulfill the state's legal requirements. Dividing the state into eighteen areas, the WVHEA assigned testing coordinators and centers to each section. The testing conditions were closely monitored and the testing materials were returned to the WVCEA for grading and reporting to the County Boards of Education. The data were obtained from the WVCEA for the purposes of this study.

The mailing list was also obtained from the WVCEA. Since many problems have occurred in West Virginia concerning past survey research, WVHEA President Don Fox suggested that the area testing coordinators could lend assistance in this study by conducting the survey with their constituents. A self-addressed and stamped envelope was included in each survey packet sent to each area coordinator. A letter from the WVHEA explaining the study and assuring confidentiality of responses was also sent to these coordinators. For those still unsure about the purpose of the survey or motives of the researcher, phone calls were made to present further explanation and to follow up surveys. Seventy-two surveys were sent to area coordinators for the families of these eighty-one children.

It was reported that thirty-five of these seventy-two families had moved and, thus, were not available for interviewing. Of the remaining thirty-seven families, nine responded to the coordinators' interviews and eleven to telephone follow up.

Seventeen home-schooling parents did not participate in the survey for the following reasons. Four families felt offended about being interviewed. Ten families were "too busy" to complete the survey, while three were not home when called.

Data Analysis

The first section of the null hypotheses relates to CTBS performances for third, sixth, ninth, and eleventh grades of home-schooled and of the West Virginia public-schooled samples. The SPSS (1988) was utilized to tabulate t-tests which measured the significance of differences between the home-school and public-school means. The third- and sixth-grade group tabulations posed little difficulty, since both were administered the CTBS during Spring 1989. Grades nine and eleven of the public school, however, were administered the test about five months prior to the time when the ninth- and eleventh-grade home-schooling sample was. To remedy this difficulty, both the home-schooled and the public-schooled sample means were subtracted from their respective norms and, then, the differences from the respective norms were analyzed for significance by use of t-tests. For example, the home-schooling Spelling mean was subtracted from the Spring norm; the public-school Spelling mean was subtracted from the Fall norm. The two differences were then tested for any significant difference between each other by use of a t-test. If the difference between any mean and the respective norm is negative, then that

negative number was subtracted from the mean of the other group's difference. The result was then used in the t-test equation.

The next section of null hypotheses was tested through use of t-tests or chi square distribution. The selected characteristics of home-schooling families were compared with those of West Virginia families through use of the Statistical Abstracts of the United States (United States Bureau of the Census, 1989). Thus, income, parental education and occupation, family size, and locale of residence of home-schooling families were compared statistically through use of t-tests or chi square.

The chi-square distribution and Fisher's Exact Test were adopted to compare experimental results with expected results from enumerative data (Johnson, 1984). The experimental results from survey data were compared with expected results from the West Virginia population. The variance of these home-schooling groups from the West Virginia population was measured by chi-square distribution and/or Fisher's Exact Test and compared with the appropriate table of critical values (Blalock, 1960; Johnson, 1984, p.525).

The third area of statistical analysis involved identification of home-schooling family characteristics which may predict the child's CTBS performance. Again, the SPSS (1988) was utilized to perform multiple regression analysis to identify correlation among variables. The variables were entered into the analysis through stepwise regression. Analysis of power of the multiple regression analysis was determined by selecting a significance criterion of .05, the desired power for the Fisher Test of .80, and an estimated R of .40.

The following null hypotheses were tested in this study.

Null Hypotheses

The null hypotheses for grades 3, 6, 9, 11 concern three areas in this study: 1) CTBS scores; 2) family demographics; and, 3) predictors of home-schooled children's CTBS Composite Scores. Concerning CTBS mean scores, the third- and sixth-grade public- and home-schooled children's means were analyzed directly with each other, the significance of difference being measured by t test. The ninth- and eleventh-grade means, however, were analyzed by subtracting them from Fall (for public-schooled children) or Spring (for home-schooled children) national norms. Then, the respective differences were tested by the use of t tests.

CTBS Scores

1) The first set of null hypotheses includes Composite means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, the first null hypothesis states that no statistically significant difference exists between mean Composite scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Composite scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Composite means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Composite means, the null hypothesis

states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

2. The second set of null hypotheses includes Vocabulary means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Vocabulary scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Vocabulary scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Vocabulary means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Vocabulary means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

3) The third set of null hypotheses includes Reading Comprehension means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean

Reading Comprehension scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states no statistically significant difference exists between mean Reading Comprehension scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Reading Comprehension means, the null hypothesis states that no statistically significant difference exists between the difference of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Reading Comprehension means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

4) The fourth set of null hypotheses includes Spelling means for grades 3, 6, 9 and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Spelling means, the null hypothesis

states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Spelling means, the null hypothesis states that no statistically significant difference exists between differences of the means from the respective norms for home-schooled and public-schooled children.

5) The fifth set of null hypotheses includes Language Mechanics means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Language Mechanics means, the null hypothesis states no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Language Mechanics means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled

children.

6) The sixth set of null hypotheses includes Language Expression means for grades 3, 6, 9, and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Language Expression scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Language Expression scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Language Expression means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Language Expression means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

7) The seventh set of null hypotheses includes Mathematics Computation means for grades 3, 6, 9, and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant relationship exists between mean Mathematics Computation scores of home-schooled and public-

schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Mathematics Computation scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Mathematics Computation means, the null hypothesis states that no statistically significant difference exists between differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Mathematics Computation means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

8) The eighth set of null hypotheses includes Mathematics Concepts means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Mathematics Concepts scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant relationship exists between mean Mathematics Concepts scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Mathematics Concepts means, the null hypothesis states that no statistically significant difference

exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Mathematics Concepts means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

9) The ninth set of null hypotheses includes Reference Skills means for grades 6, 9, and 11.

a) The third grade was not tested in this area. The publishers of the CTBS chose not to include a Reference Skills subsection for third grade.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Reference Skills scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Reference Skills means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Reference Skills means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled

children.

10) The tenth set of null hypotheses includes Science means for grades 3, 6, 9, and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children.

   c) Concerning ninth-grade Science means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

   d) Concerning eleventh-grade Science means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

11) The eleventh set of null hypotheses includes Social Studies means for grades 3, 6, 9, and 11.

   a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children.

   b) Concerning sixth-grade means, the null hypothesis states that

no statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Social Studies means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Social Studies means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

12) The twelfth set of null hypotheses includes Total Reading means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Reading means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the

respective norms concerning home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Reading means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled children and public-schooled children.

13) The thirteenth set of null hypotheses includes Total Language means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Language means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Language means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled

children.

14) The fourteenth set of null hypotheses includes Total Mathematics means for grade 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Total Mathematics scores of home-schooled and public-schooled children.

b) Concerning sixth-grade means, the null hypothesis states that no statistically significant difference exists between mean Total Mathematics scores of home-schooled and public-schooled children.

c) Concerning ninth-grade Total Mathematics means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

d) Concerning eleventh-grade Total Mathematics means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children.

Demographics

15) No statistically significant difference exists between distribution of occupations of home-schooling and public-schooling fathers.

16) No statistically significant difference exists between the locale of residence of home-schooling and public-schooling families.

17) No statistically significant difference exists between the number of years of formal education which home-schooling parents have attended as compared with those of public-schooling parents.

18) No statistically significant difference exists between the mean yearly incomes of home-schooling and public-schooling families.

19) No statistically significant difference exists between the mean family size of home-schooling and public-schooling families.

Predictors of CTBS Scores

20) No statistically significant relationship exists between the number of years a child is intended to participate in a home school and CTBS Composite scores.

21) No statistically significant relationship exists between home-schooling parents' prior teaching certification and the child's CTBS Composite scores.

22) No statistically significant relationship exists between home-schooling family size and CTBS Composite scores of the child.

23) No statistically significant relationship exists between the home-schooling family's mean annual income and the child's CTBS Composite scores.

24) No statistically significant relationship exists between locale of residence of home-schooling families and the child's CTBS Composite scores.

25) No statistically significant relationship exists between the age at which a home-schooled child began formal academic studies and CTBS Composite scores.

26) No statistically significant relationship exists between prior

conventional education which a home-schooled child has experienced and his/her CTBS Composite scores.

Limitations and Delimitations

As summarized in chapter one, certain limitations seem apparent in this study. The sample of home-schooling families and their children probably does not represent the total population of West Virginia home-schooling families. According to the WVCEA, three hundred fifty home-schooled children were administered the CTBS in 1989, while many more were administered different testing programs. Further, many home-schooling families are suspicious of governmental entanglements and educate their children underground, rather than apply for the state's exemption from the compulsory education code. Moreover, an exhaustive comparison of home-schooling and public-schooling families was not possible in this study. Thus, such factors as IQ and family affective relations were not treated. Next, as cited in the literature review, the limitations of standardized achievement testing do no allow for recognition of higher cognitive abilities. In addition, the study is limited to those home-schooled and public-schooled children who attended third, sixth, ninth, and eleventh grades (or grade equivalents) during the 1988-1989 school year and, thus, may not be representative of other grades or other years.

Since home-schooling families tend to be private about personal affairs, they appeared to manifest discomfort about divulging personal information and may have related misinformation or avoided answering the survey. Thus, the survey results may misrepresent West Virginia home-schooling families. In addition, about half of the home-schooling families on the mailing list changed residences between the time of

testing and the inception of this study.

Certain factors were delimited in this study. Only West Virginia home-schooling families were chosen. The home-schooling families who utilized the WVCEA testing program and who were included in the mailing list were studied in this analysis. The children who were administered the CTBS during the 1988-1989 school year made up the experimental and comparison groups.

Summary

This study sought to analyze CTBS performances of home-schooled and public-schooled children. It also analyzed demographic factors of home-schooling families. Then, selected demographic factors of home-schooling families were analyzed for possible correlation with performance on the CTBS through use of multiple regression analysis. The results of the CTBS comparison, survey response, and analysis of the correlations are reported in the following chapter.

CHAPTER FOUR

ANALYSIS OF DATA

Data analyzed in this study concern three areas noted in the previous chapter. Each section of null hypotheses--CTBS scores, survey results, and predictors of CTBS scores--is herein restated and compared with the results of the appropriate statistical method. These results of t-tests were tested at $p<.01$ or $p<.05$ levels of confidence. The summaries of testing data and t-test values are recorded in Tables 1-5, respectively. The t-test values were compared with the two-tailed t-test table found in Mason and Bramble (1978, p. 383). The third- and sixth-grade means of home-schooling and public-schooling children were compared directly. Since the ninth and eleventh grades were administered the CTBS at different times of the school year (the public schools in October, 1988 and the home schools in March, 1989), the differences of the means from their respective norms were compared through use of t-tests.

CTBS Scores

1) The first set of null hypotheses includes Composite means for grades 3, 6, 9 and 11.

   a) Concerning third-grade means, the first null hypothesis stated that no statistically significant difference exists between mean Composite scores of home-schooled and public-schooled children. Referring to Table 1, the

Table 1

A Comparison of Home-Schooling and

Public-Schooling CTBS Mean Scores

Third Grade

Subsection	H.S. Means	P.S. Means	t-test Value
Composite	659.1	648.8	1.62
Vocab	656.6	641.7	2.13
RdgComp	663.8	657.5	2.72
Spelling	602.9	640.7	3.65
LangMech	646.6	653.2	1.30
LangExp	654.8	656.8	.19
MathComp	659.8	650.7	1.04
Math Conpt	670.8	631.7	4.24
Science	643.5	601.0	5.45
SocStud	663.4	653.2	1.56
TotRdg	660.1	649.9	1.50
TotLan	651.0	655.3	.60
TotMat	666.2	641.4	3.19

home-schooling mean exceeded the public-schooling mean by 10.3 (Table 1), yielding a t-test value of 1.62 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Composite scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Composite scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 19.2 (Table 2), yielding a t-test value of 2.56 which exceeds the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Composite scores.

c) Concerning ninth-grade Composite means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 2 (Table 3) (favoring home school), yielding a t-test value of .36 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Composite scores.

d) Concerning eleventh-grade Composite scores, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the norms, subtracted from each other, equal 9.7 (Table 4) (in favor of home school), yielding a t-test value of .81 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Composite scores.

2) The second set of null hypotheses includes Vocabulary means for grades 3, 6, 9 and 11.

Table 2

A Comparison of Home-Schooling and Public-Schooling

CTBS Mean Scores

Sixth Grade

Subsection	H.S.Means	P.S. Means	t-test Value
Composite	736.1	716.9	2.56
Vocab	740.1	716.2	2.18
RdgComp	783.9	746.5	3.78
Spelling	695.3	707.2	1.16
LanMech	718.9	713.3	.78
LanExpr	744.1	707.8	2.50
MatComp	721.7	720.4	.32
MatConct	706.4	696.4	1.50
RefSkl	731.0	723.5	.62
Science	728.3	701.7	2.12
SStud	728.1	706.5	3.66
TotRdg	762.0	731.6	3.13
TotLan	731.7	710.8	1.99
TotMat	714.2	708.7	1.22

Table 3

A Comparison of Home-Schooling and

Public-Schooling CTBS Mean Scores

Ninth Grade

Subsections	Home Schooling			Public Schooling		
	Means	Norms	D	Means	Norms	D
Composite	749.3	740	9.3	736.3	729	7.3
Vocab	774.8	746	28.8	738.0	729	9.0
RdgComp	802.2	788	14.2	766.5	765	1.5
Spelling	740.5	735	5.5	734.6	721	13.6
LanMech	741.6	733	8.6	733.2	713	20.2
LanExpr	737.4	725	12.4	723.2	711	12.2
MatComp	727.3	736	-8.7	736.0	732	4.0
MatCont	711.2	723	-11.8	719.0	714	5.0
RefSkl	761.0	751	10.0	739.5	725	14.5
Science	747.5	731	16.5	725.4	716	9.4
SStud	761.1	735	26.1	733.3	718	15.3
TotRdg	788.8	767	21.8	752.2	747	5.2
TotLan	739.7	726	13.7	728.5	713	15.5
TotMat	719.1	731	-11.9	727.8	723	4.8

Table 4

A Comparison of Home-Schooling and

Public-Schooling Mean Scores

Eleventh Grade

Subsections	Home Schooling			Public Schooling		
	Means	Norms	D	Means	Norms	D
Composite	780.3	754	16.3	753.6	747	6.6
Vocab	818.0	768	50.0	762.2	763	.8
RdgComp	819.3	800	19.3	795.4	792	3.4
Spelling	762.3	743	31.2	745.9	741	4.9
LanMech	787.3	751	36.3	752.3	738	14.3
LanExpr	747.7	740	7.7	734.2	729	5.2
MatComp	755.7	745	10.7	743.5	741	2.5
MatCont	749.0	737	12.0	732.5	731	1.5
RefSkl	801.0	771	30.0	768.5	762	6.5
Science	784.0	747	37.0	741.1	734	7.1
SStud	811.7	757	54.7	755.8	742	13.8
TotRdg	819.0	782	37.0	779.1	775	4.1
TotLan	767.7	741	26.7	743.6	732	11.6
TotMat	752.7	737	15.7	738.3	735	3.3

Table 5

T-Test Values for Home-Schooling and

Public-Schooling CTBS Mean Scores

Ninth and Eleventh Grades

Subsection	Ninth	Eleventh
Composite	.36	.81
Vocabulary	1.92	2.41
Reading Comp	2.09	1.35
Spelling	.25	1.35
LanMech	1.14	1.10
LanExpr	.04	.17
MatCom	2.63	.87
MatCont	2.73	1.08
RefSkl	.60	.87
Science	.87	1.83
SStud	1.44	1.77
TotRdg	2.23	2.06
TotLan	.26	1.06
TotMat	3.12	1.61

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Vocabulary scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 14.9 (Table 1), yielding a t test value of 2.13 which exceeds the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning third-grade mean Vocabulary scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Vocabulary scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 23.9 (Table 2), yielding a t-test value of 2.18 which exceeds the critical value 1.96 ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Vocabulary scores.

c) Concerning ninth-grade Vocabulary means, the null hypothesis stated that no statistically significant difference exists between the differences for the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 19.8 (Table 3) (in favor of home school), yielding a t-test value of 1.92 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade Vocabulary scores.

d) Concerning eleventh-grade Vocabulary means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 49.2 (Table 4) (in favor of home school), yielding a t-test value of 2.41 which exceeds the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning eleventh-grade mean Vocabulary scores.

3) The third set of null hypotheses includes Reading Comprehension means for grades 3, 6, 9 and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between mean Reading Comprehension scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 6.3 (Table 1), yielding a t-test value of .79 which does not exceed the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Reading Comprehension scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Reading Comprehension scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 37.4 (Table 2), yielding a t-test value of 3.78 which exceeds the critical value of 2.58

($p<.01$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Reading Comprehension scores.

c) Concerning ninth-grade Reading Comprehension means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 12.7 (Table 3) (in favor of home school), yielding a t-test value 2.09 which surpasses the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning ninth-grade mean Reading Comprehension scores.

d) Concerning eleventh-grade Reading Comprehension means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 15.9 (Table 4) (in favor of home school), yielding a t-test value of 1.35 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Reading Comprehension scores.

4) The fourth set of null hypotheses includes Spelling means for grades 3, 6, 9 and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children. The public-schooling mean exceeded the home-schooling mean by 37.8 (Table 1), yielding a t-test value of 3.65 which surpasses the critical value of 2.58 ($p<.01$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning third-grade mean Spelling scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Spelling scores of home-schooled and public-schooled children. The public-schooling mean exceeded the home-schooling mean by 11.9 (Table 2), yielding a t-test value of 1.16 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning sixth-grade mean Spelling scores.

c) Concerning ninth-grade Spelling means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 8.1 (Table 3) (in favor of public school), yielding a t-test value of .25 which does not exceed the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Spelling scores.

d) Concerning eleventh-grade Spelling means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 26.3 (Table 4), yielding a t-test value of 1.35 which does not exceed the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Spelling scores.

5) The fifth set of null hypotheses includes Language Mechanics means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children. The public-schooling mean exceeded the home-schooling mean by 6.6 (Table 1), yielding a t-test value of 1.30 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade Language Mechanics scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Language Mechanics scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 5.6 (Table 2), yielding a t- test value of .78. Thus, the null hypothesis is retained concerning sixth-grade mean Language Mechanics scores.

c) Concerning ninth-grade Language Mechanics means, the null hypothesis stated that no statistically significant difference exists between differences of means from the respective norms for home-schooled and public-schooled children. The differences of the means from respective norms, subtracted from each other, equal 11.6 (Table 3) (in favor of public school), yielding a t-test value of 1.14 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade Language Mechanics scores.

d) Concerning eleventh-grade Language Mechanics means, the null hypothesis stated that no statistically significant difference exists between the differences of means from the respective norms for home-schooled and public-schooled children. Differences of means from the respective norms, subtracted from each other, equal 24.0 (Table 4) (in favor of home school), yielding a t-test value of 1.10, and not surpassing critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning grade eleven means.

6) The sixth set of null hypotheses includes Language Expression means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between mean Language Expression scores of home-schooled and public-schooled children. The public-schooling mean exceeded the home-schooling mean by 2.0 (Table 1), yielding a t-test value

of .19 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade Language Expression scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Language Expression scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 36.3 (Table 2), yielding a t-test value of 2.50 which surpasses the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Language Expression scores.

c) Concerning ninth-grade Language Expression means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 0.2 (Table 3), yielding a t-test value of .04 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade Language Expression scores.

d) Concerning eleventh-grade Language Expression means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled

children. The differences of the means from the respective norms, subtracted from each other, equal 2.5 (Table 4) (in favor of home school), yielding a t-test value of .17 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Language Expression scores.

7) The seventh set of null hypotheses includes Mathematics Computation means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant relationship exists between mean Mathematics Computation scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 9.2 (Table 1), yielding a t-test value of 1.04 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Mathematics Computation scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Mathematics Computation scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 1.3 (Table 2), yielding a t-test value of 0.32 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning sixth-grade mean Mathematics Computation scores.

c) Concerning ninth-grade Mathematics Computation means, the null hypothesis stated that no statistically significant difference

exists between differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 12.7 (Table 3) (in favor of public school), yielding a t-test value of 2.63 which surpasses the critical value of 2.58 ($p<.01$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning ninth-grade mean Mathematics Computation scores.

d) Concerning eleventh-grade Mathematics Computation means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 8.2 (Table 4), (in favor of public school), yielding a t-test value of 0.25 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade Mathematics Computation scores.

8) The eighth set of null hypotheses includes Mathematics Concepts means for grades 3, 6, 9, and 11..

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between mean Mathematics Concepts scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 39.1 (Table 1), yielding a t-test value of 4.24 which surpasses the critical value of 2.58

($p<.01$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning third-grade mean Mathematics Concepts scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant relationship exists between mean Mathematics Concepts scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 10.0 (Table 2), yielding a t-test value of 1.5 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning sixth-grade mean Mathematics Concepts scores.

c) Concerning ninth-grade Mathematics Concepts means, the null hypothesis stated no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of means from the respective norms, subtracted from each other, equal 16.8 (Table 3) (in favor of public school), yielding a t-test value of 2.73 which surpasses the critical value of 2.58 ($p<.05$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning ninth-grade mean Mathematics Concepts scores.

d) Concerning eleventh-grade Mathematics Concepts means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled

children. The differences of the means from the respective norms, subtracted from each other, equal 10.5 (Table 4) (in favor of home school), yielding a t-test value of 1.08 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Mathematics Concepts scores.

9) The ninth set of null hypotheses includes Reference Skills means for grades 6, 9, and 11.

   a) The third-grade was not tested in this area. The publishers of the CTBS chose not to include this subsection for third grade.

   b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between mean Reference Skills scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 7.5 (Table 2) (in favor of home school), yielding a t-test value of .62 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning sixth-grade mean Reference Skills scores.

   c) Concerning ninth-grade mean Reference Skills scores, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal

4.5 (Table 3) (in favor of public school), yielding a t-test value of .60 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Reference Skills scores.

d) Concerning eleventh-grade Reference Skills means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 23.5 (Table 4) (in favor of home school), yielding a t-test value of .87 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Reference Skills scores.

10) The tenth set of null hypotheses includes Science means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 42.5 (Table 1), yielding a t-test value of 5.45 which surpasses the critical value of 2.58 ($p<.01$). Thus, the null hypothesis is rejected in favor of the research

hypothesis concerning third-grade mean Science scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Science scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 27.6 (Table 2), yielding a t-test value of 2.12 which exceeds the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Science scores.

c) Concerning ninth-grade Science means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 7.1 (Table 3) (in favor of home school), yielding a t-test value of .87 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Science scores.

d) Concerning eleventh-grade Science means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from

the respective norms, subtracted from each other, equal 29.9 (Table 4) (in favor of home school), yielding a t-test value of 1.83 which does not exceed the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Science scores.

11) The eleventh set of null hypotheses includes Social Studies means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 10.2 (Table 1), yielding a t-test value of 1.56 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Social Studies scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Social Studies scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 21.6 (Table 2), yielding a t-test value of 3.66 which surpasses the critical value of 2.58 ($p<.01$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning sixth-grade mean Social Studies

scores.

c) Concerning ninth-grade Social Studies means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 10.8 (Table 3) (in favor of home school), yielding a t-test value of 1.44 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Social Studies scores.

d) Concerning eleventh-grade Social Studies means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 39.9 (Table 4) (in favor of home school), yielding a t-test value of 1.77 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Social Studies scores.

12) The twelfth set of null hypotheses includes Total Reading means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated

that no statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 10.2 (Table 1), yielding a t-test value of 1.50 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Total Reading scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Total Reading scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 30.4 (Table 2), yielding a t-test value of 3.13 which does surpass the critical value of 2.58 ($p<.01$). Thus, the null hypothesis is rejected concerning sixth-grade mean Total Reading scores.

c) Concerning ninth-grade Total Reading means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms concerning home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 16.6 (Table 3) (in favor of home school), yielding t-test value of 2.23 which surpasses the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is

rejected in favor of the research hypothesis concerning ninth-grade mean Total Reading scores.

d) Concerning eleventh-grade Total Reading means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled children and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 32.9 (Table 4) (in favor of home school), yielding a t-test value of 2.06 which does surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning eleventh-grade mean Total Reading scores.

13) The thirteenth set of null hypotheses includes Total Language means for grades 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children. The public-schooling mean exceeded the home-schooling mean by 4.3 (Table 1), yielding a t-test value of .60 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning third-grade mean Total Language scores.

b) Concerning sixth-grade means, the null hypothesis stated

that no statistically significant difference exists between the mean Total Language scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 20.9 (Table 2), yielding a t-test value of 1.99 which surpasses the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is rejected concerning sixth-grade mean Total Language scores.

c) Concerning ninth-grade Total Language means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 1.8 (Table 3) (in favor of public school), yielding a t-test value of .26 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning ninth-grade mean Total Language scores.

d) Concerning eleventh-grade Total Language means, the null hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 15.1 (Table 4) (in favor of home school), yielding a t-

test value of 1.06 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Total Language scores.

14) The fourteenth set of null hypotheses includes the Total Mathematics means for grade 3, 6, 9, and 11.

a) Concerning third-grade means, the null hypothesis states that no statistically significant difference exists between mean Total Mathematics scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 24.8 (Table 1), yielding a t-test value of 3.19 which surpasses the critical value of 2.58 ($p<.01$). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning third-grade mean Total Mathematics scores.

b) Concerning sixth-grade means, the null hypothesis stated that no statistically significant difference exists between the mean Total Mathematics scores of home-schooled and public-schooled children. The home-schooling mean exceeded the public-schooling mean by 5.5 (Table 2), yielding a t-test value of 1.22 which does not surpass the critical value of 1.96 ($p<.05$). Thus, the null hypothesis is retained concerning sixth-grade mean Total Mathematics scores.

c) Concerning ninth-grade Total Mathematics means, the null

hypothesis stated that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 16.7 (Table 3) (in favor of public school), yielding a t-test value of 3.12 which surpasses the critical value of 2.58 ($p<.01$) (Table 5). Thus, the null hypothesis is rejected in favor of the research hypothesis concerning ninth-grade mean Total Mathematics scores.

d) Concerning eleventh-grade Total Mathematics means, the null hypothesis states that no statistically significant difference exists between the differences of the means from the respective norms for home-schooled and public-schooled children. The differences of the means from the respective norms, subtracted from each other, equal 12.4 (Table 4) (in favor of home school), yielding a t-test value of 1.61 which does not surpass the critical value of 1.96 ($p<.05$) (Table 5). Thus, the null hypothesis is retained concerning eleventh-grade mean Total Mathematics scores.

In summary, the CTBS means for home-schooled children equalled or exceeded those of public-schooled children in most sections. The means of third-grade home-schooled children exceeded those of public-schooled children in all areas except Language Mechanics, Language Expression, and Total Language. No statistically significant difference, however, existed

between the third-grade groups in the areas of Composite, Language Mechanics, Language Expression, Mathematics Computaion, Social Studies, Total Reading, and Total Language. The sixth-grade home-schooled children's means exceeded the public-schooled means in all areas except Spelling, although no statistically significant difference between means was found in the areas of Spelling, Language Mechanics, Mathematics Computation and Mathematic Concepts, and Total Mathematics scores. The ninth-grade home-schooled children's differences of means from the Spring norms exceeded the public school differences from the Fall norms in the areas of Composite, Vocabulary, Reading Comprehension, Language Expression, Science, Social Studies, and Total Reading, while Mathematics Computations, Mathematics Concepts, Total Mathematics scores were favorable to the ninth-grade public-schooled children. The ninth-grade home-schooled children's means were significantly higher in areas of Vocabulary, Reading Comprehension, and Total Reading. The eleventh-grade home-schooled children's differences of the means from the Spring norms exceeded the public-schooled children's differences of the means from the Fall norms in all areas, yet manifested significant differences in only Reading Comprehension, Vocabulary, and Total Reading. All grades saw no significant difference concerning Reference Skills scores.

Demographics

15) The fifteenth null hypothesis stated that no statistically significant difference exists between distribution of occupations of home-schooling and public-schooling fathers. Table 6 was compiled from survey results and The Statistical Abstracts of the

Table 6

Analysis of Home-Schooling Fathers' Occupations

Compared with West Virginia

Fathers at Large

Occupation	Home Schooling		West Virginia	
Category	Frequency	Percent	Frequency	Percent
Unskilled	2	10	11,604	25
Skilled	4	20	11,376	23
Professional	14	70	24,442	52
	20	100	47,422	100

= 1.29

Degrees of freedom = 1; Critical value at .05 = 3.84

United States (United States Bureau of the Census, 1989). Utilizing chi-square distribution and Fisher's Exact Test, and collapsing skilled and unskilled categories to raise the cell count to six, the critical value at .05 is 3.84. The chi-square total of 1.29 lies within the critical value as does Fisher's Exact Statistic (6.2 x 10). Thus, observed occupational frequencies of home-schooling fathers do not differ significantly from West Virginia occupational frequencies, and the null hypothesis is retained: no statistically significant difference exists between occupational distributions of home-schooling and public-schooling fathers.

16) The sixteenth null hypothesis stated that no statistically significant difference exists between locale of residence of home-schooling and public-schooling families. Statistical Abstracts

of the United States tabulations (United States Bureau of the Census, 1989) and survey results are listed in table 7.

Table 7

Locale of Residence of West Virginia Home-Schooling Families and West Virginia Population at Large

Locale	Home School		West Virginia	
	Frequency	Percent	Frequency	Percent
Metropolitan	6	30	702	36.6
Nonmetropolitan	14	70	1217	63.4
	20	100	1919	100.0

West Virginia totals represent per 1000 people.
= .17 Degrees of freedom = 1; Critical value at .05 = 3.84

The result is 0.17 which does not exceed the critical value. Thus, the null hypothesis is retained: no significant difference exists between the distribution of locale of residence of home-schooling families as compared with West Virginia families at large.

17) The seventeenth null hypothesis stated that no statistically significant difference exists between the number of years of formal education which home-schooling parents have attended as compared with those of a public-schooling parent. In Table 8, the categories translate into an average of fifteen years which is the equivalent of three years of college. The Statistical Abstracts United States (United States Bureau of the Census, 1989)

Table 8

Home-Schooling Fathers' and Mothers'

Years of Formal

Education

Education	Frequency	Percent	Frequency	Percent
High School	3	15	7	35
Two Years	4	20	2	10
Four Years	9	45	10	50
Master's	2	10	1	5
Doctor's	1	5	0	0
Post Doctor's	1	5	0	0
	20	100	20	100

The West Virginia mean is 12.9. The home-schooling mean is 15.0.

$t = 3.50$; Critical value = 2.58 ($p<.01$).

reveals an average of 12.9 years of education for West Virginia residents. The difference of 2.1 years yields a t-test value of 3.50 which exceeds the critical value of 2.58 ($p<.01$). The null hypothesis is rejected in favor of the research hypothesis at $p<.01$: a statistically significant difference exists between the years of formal education attended by home-schooling parents as compared with those of public-schooling parents.

18) The eighteenth null hypothesis stated that no statistically

significant difference exists between the mean yearly incomes of home-schooling and public-schooling families. The mean West Virginia yearly income was $18,405 (United States Bureau of Census, 1989). The mean home-schooling family income registered in the 21,000 - 30,000 category and translated into an average income of $22,000. The difference of $3595 yields a t-test value of 3.57 which exceeds the 2.58 limit at $p<.01$ significance. The null hypothesis is overturned in favor of the research hypothesis: a statistically significant difference exists between the mean yearly incomes of home-schooling and public-schooling families.

19) The nineteenth null hypothesis stated that no statistically significant difference exists between the mean family size of home-schooling and public-schooling families. The mean size of West Virginia families with children under eighteen years of age is 3.15 (United States Bureau of the Census, 1989), while the home-schooling sample averaged 5.45 people in each family. The difference of 2.30 produces a t-test value of 7.01 which exceeds the limit of 2.58 ($p<.01$). The null hypothesis is overturned in favor of the research hypothesis: a statistically significant difference exists between the mean family size of home-schooling and public-schooling families.

Predictors of CTBS Scores

The correlation matrix listed in table 9 contains the values of the multiple regression analysis for the following hypotheses. The survey response allowed a large enough margin for a significance at .05 with power of .80. (Cohen & Cohen, 1975; p. 117).

TABLE 9

Correlation Matrix of Selected Factors and CTBS Composite Scores of West Virginia Home-Schooled Children

	CERT	FAMINC	HOMESET	NOCHIL	FOAGE	ATCONV	LEHS
CTBS	.098	-.040	.331	-.233	-.504	-.006	.513
FAMINC	-.145	1.000	.312	-.133	-.272	-.107	-.168
HOMSET	.437	.312	1.000	.072	-.295	.092	.151
NOCHIL	-.100	-.133	.072	1.000	.344	.295	-.395
FOAGE	-.018	-.272	-.295	.344	1.000	.576	-.187
ATCONV	-.185	-.107	.092	.295	.576	1.000	.513
LEHS	.018	-.168	.151	-.395	-.187	.149	1.000
CERT	1.000	-.145	.437	-.100	-.018	-.185	.018

20) The twentieth null hypothesis stated that no statistically significant relationship exists between the number of years a child is intended to participate in a home school and CTBS Composite scores. The correlation matrix lists a value of .513. Coupled with = .26 and F = 6.43, a linear relationship is noted between intended length of home-schooling and CTBS Composite scores, which is significantly different from zero ($p<.05$). Thus, the null hypothesis is rejected in favor of the research hypothesis: a statistically significant relationship exists between intended length of home-schooling and CTBS Composite scores.

21) The twenty-first null hypothesis stated that no statistically significant relationship exists between home-schooling parents' prior teaching certification and the child's CTBS Composite scores. The correlation matrix (table 9) indicates a value of .098, together with a t-test value of .44, signifying little effect of this factor on CTBS scores. Thus, the null hypothesis is retained: no statistically significant relationship exists between prior parental teaching certification and the child's CTBS Composite scores.

22) The twenty-second null hypothesis stated that no statistically significant relationship exists between home-schooling family size and CTBS Composite scores. The correlation between family size and CTBS Composite scores, according to table 9, is -.233. In addition, the t-test value of -.159 does not indicate a significant difference from 0 ($p<.05$). Therefore, a minimal negative correlation exists between family size and CTBS Composite scores. The null hypothesis is retained: no statistically significant relationship exists between home-schooling family size and CTBS Composite scores.

23) The twenty-third null hypothesis stated that no statistically significant relationship exists between the home-schooling family's mean yearly income and CTBS Composite scores. The correlation matrix indicates a slightly negative correlation (-.040). Further, a t-test value of .227 indicates no significant difference from 0 ($p<.05$). Thus, the null hypothesis is retained: no statistically significant relationship exists between family mean yearly income and CTBS Composite scores.

24) The twenty-fourth null hypothesis stated that no statistically significant relationship exists between the locale of residence of the home-schooling family and the child's CTBS Composite scores. The matrix lists a correlation of .331. Further, a t-test value of 1.29 is noted which indicates little correlation between these factors. Thus, the null hypothesis is retained: no statistically significant relationship exists between the home-schooling family's locale of residence and the child's CTBS Composite scores.

25) The twenty-fifth null hypothesis stated that no statistically significant relationship exists between the age at which a home-schooled child began formal academic studies and CTBS Composite scores. The matrix lists a correlation of -.504 which indicates a moderate inverse correlation between the two factors. In addition, $R = .44$ and $F = 6.56$ were tabulated. Therefore, the null hypothesis is overturned in favor of the research hypothesis: a statistically significant relationship exists between the age at which a home-schooled child began formal academic studies and the child's CTBS Composite scores.

26) The twenty-sixth null hypothesis stated that no statistically significant relationship exists between prior conventional education which a home-schooled child has experienced and his/her CTBS Composite scores. The correlation of -.006 and a t-test value of 1.24 ($p<.05$) indicate little correlation between the factors. The null hypothesis is retained: no statistically significant relationship exists between the child's prior conventional education experience and his/her CTBS Composite scores.

Certain factors exhibited moderate correlations with CTBS scores. The factor positively correlated with the CTBS scores is the length of time the child was intended to participate in home-schooling. An inverse correlation was noted between the age a child began formal home education and CTBS Composite scores. How these results affect educational theory and the research about home-schooling is the subject of chapter five.

CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This section attempts to identify factors affecting the results reported in chapter 4. This discussion examines the three areas of inquiry in this study-- CTBS scores, survey results, and predictors of performance on the CTBS.

CTBS Scores

Certain factors hampered the significance of the analysis of CTBS scores. The eleventh-grade home-schooling means were based on a sampling size of three. Thus, the t-test values were deflated by a large denominator brought about by the small n. The generalizability of such a small sample is limited. Next, the different times of year in which the ninth and eleventh grades were administered the test hindered the comparability of the samples.

Certain trends became apparent in this analysis. The home-schooled children seemed to perform well in reading areas. Their Reading Comprehension and Vocabulary means were generally higher than the public-school means. This performance may reflect the home-schooling parents' emphasis on teaching the child how to read. Social Studies, a topic which also requires primarily reading skills, appeared to be a strength for the home-schooling sample.

Another trend involved experiential learning. Home-schooling families tend to emphasize learning through doing (Moore, 1984).

Therefore, experimenting with natural phenomena, visiting places of interest, and even performing chores are frequently emphasized in home-schooling settings (Moore, 1984). The home-schooled children's performance in Science may reflect this emphasis on the practical and experiential.

Contrarily, the home-schooling parents' emphasis on the practical and experiential may distract from the child's attention to subjects which require repetition and memorization. The home-schooled children's Spelling means were consistently lower than the West Virginia sample. Even the Language areas performance was only equal to or lower than the West Virginia public-school norms. Mathematics results may reflect the disdain many home-schooling parents possess toward rote learning. This result appears to agree with Frost (1988) who also reported Illinois home-schooled children's lower achievement test scores in areas which require rote learning.

Survey Results

Certain factors hampered the generalizability of this study. The response of the home-schooling families to the survey was limited. The number of home-schooling families which changed residences during the preceding year makes interpretation of results difficult. The survey's representativeness of home-schooling families was not only weakened by the existence of hundreds of West Virginia home-schooling families not represented in the WVHEA testing program, but also by the low response rate to the survey. Indeed, the respondents may be the well-educated home-schooling parents who have experienced the rigors of academia and, therefore, may have been more apt to respond to a survey than would some

home schoolers who are distrustful of institutionalized education in general.

The home-schooling sample appeared to have experienced a significantly greater number years of formal education than the population of West Virginia in general. Though criticism is voiced against the home-schooling parents' supervising their child's education (Franzosa, 1984), it seems improbable that a sample so well educated would neglect their child's education. The results about the home-schooling parents' education level appears also to agree with other researchers' findings (Rose, 1985; Taylor, 1986).

The size of the home-schooling family in West Virginia appears to be different from that of the state's population. The size of home-schooling families may reflect their emphasis on family-centered life styles which appear to differ greatly from those held by society at large. The home-schooling families believe that children enhance rather than detract from life (Gustavsen, 1981; Williams et al., 1984). To accommodate a family with larger number of children, many home-schooling families choose to live in rural locations or in small towns (Greene, 1984; Colfax and Colfax, 1988). The results of this study may also support the finding that most West Virginia home-schooling families reside in nonmetropolitan areas.

Predictors of CTBS Scores

Before any analysis of correlation is made, it should be noted that correlation does not suggest causation; correlation indicates the strength of relationship between variables. It does not define extraneous variables which may affect that relationship.

The intended length a home-schooling parent wishes to educate his child at home is the strongest positive correlation in this regression analysis. The duration which a parent perceives adequate to educate his child and to which he/she commits himself/herself may affect the quality of education he/she gives to his/her child. A parent who intends to educate his/her child a lesser number of years may not expend the amount of effort required to teach a child thoroughly because he/she has the option of public school upon which to rely. A parent who plans, though, to educate his/her child until the end of high school may feel greater responsibility for his/her child's education and, consequently, may expend greater effort to ensure the quality of his/her child's academic experience.

The negative correlation between the age at which a child began formal studies in the home school and CTBS performance arouses curiosity. Moore and Moore (1979) argue strongly that children below seven/eight years of age have difficulty academically because of developmental limitations; consequently, one would expect a positive correlation between these two variables. It may be, however, that the respondents who appear highly educated were more likely to answer the survey and were more likely to believe in early education than those not included in the study. Therefore, the home-schooling parents who may defer their child's education until seven or eight years of age may not be represented in this survey.

Conclusions

Though survey response may limit the generalizability of this study, certain conclusions may be drawn. The home-schooled child receives an

adequate education, if the CTBS performances are any indicator of such. Next, the home-schooling family appears to possess, on the average, a significantly higher level of income and education than other West Virginia families. The West Virginia home-schooling family size is significantly larger than the mean family size of the state's families. The home-schooling family mostly likely resides in a small town or rural location, as do many families in West Virginia. Further, the home-schooled child's academic performance seems to be affected by the length of time the parent plans to educate the child at home, and the age of a child began formal studies.

The home-schooling family appears to provide an environment which facilitates academic achievement and, thus, is an educational option which requires the attention of parent and educator.

Recommendations

Certain areas of inquiry will provide important information concerning home-schooling families and their children. A longitudinal study utilizing a variety of measurements, such as those which ascertain self concept or IQ, would be valuable. Further, studies which examine the home-schooled child's cognitive and affective development have been sparingly employed (Maarse-Delahooke, 1986; Quine & Marek, 1988). Next, more precise documentation of home-schooling families' interactions and application of sophisticated testing instruments to study them will shed more light on home-schooling family relations and incidence of academic giftedness.

Certain strategies may assist the researcher in gaining access to home-schooling families. Since the WVHEA sponsors yearly testing programs

for home-schooling families, a researcher may be able to administer a survey by attending testing sessions in person. In this study, personal communication allayed mistrust which many home schoolers hold toward researchers. Another strategy concerns gaining confidence among home-schooling parents. Making friendships and allowing leaders to become acquainted with the researcher will yield enhanced response. Further, one who has educated his child at home will gain more trust from home-schooling respondents than one who has not experienced this form of education with his children.

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